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Checklist of medically important Hymenoptera of Afghanistan

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Checklist of medically important Hymenoptera of Afghanistan

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Abstract. A recent investigation was conducted to assess the threat of insect venom hypersensitivity to deployed U.S. service members operating in the region. In parallel with this study, a checklist of medically important Hymenoptera was assembled from limited field collections as well as a comprehensive review of the literature and information provided by electronic databases. We compiled names of 14 families comprising 396 species of Hymenoptera capable of stinging humans. This is the first such checklist for Afghanistan, and should aid future taxonomic work and provide reference information for public health-related entomology in this region.

Introduction

Afghanistan is a landlocked country located in south-central Asia with an area of approximately 650,000 square kilometers. It is dominated by the Hindu Kush and Himalayan mountain ranges in the north and arid desert to the south. Afghanistan is an entomologically understudied country but is undoubtedly rich in insect fauna due to its diversity of habitats. During a 2010 deployment in support of Operation Enduring Freedom, a study was conducted to determine the prevalence of insect stings and venom hypersensitivity in military personnel operating in Afghanistan (Turbyville et al. 2013). Because of the rugged terrain, lack of readily accessible medical facilities, and political instability of the country, prompt medical attention is not always available to military personnel, international aid workers, and local nationals who may suffer severe allergic reactions to Hymenoptera venom. In order to initially assess this threat, we compiled a list of potentially medically important Hymenoptera (i.e., capable of sting/venom injection in humans) from limited field collections and observations, as well as from a comprehensive review of relevant literature. We recorded the sociality of hymenopteran species known to occur in Afghanistan when reported in the literature; social taxa are capable of demonstrating more aggressive behavior in Hymenoptera (Pankiw 2009). We did not assess the level of sociality (e.g., primitive or highly social) in social species, but those belonging to the apine bees, paper-nesting wasps, yellow-jackets, hornets, and ants can display highly social behaviors (Goulet and Huber 1993).

This list should be considered preliminary, as additional Hymenoptera species of medical importance undoubtedly occur in Afghanistan. For example, ants exhibit intrageneric variation in the presence or absence of a produced sting and differentiation between sting-produced reactions and reactions from abdominally-secreted chemicals is ambiguous; therefore it was difficult to recognize stinging ants of medical importance in the literature. Klotz et al. (2005) reported many stinging ant genera of medical significance, although not all species of these genera possess a sting. No attempt was made to compile

names of Hymenoptera taxa without modified ovipositors capable of stinging humans; however, additional taxa (e.g., sawflies, microhymenoptera) are reported in the literature for Afghanistan.

Methods and Materials

We collected Hymenoptera primarily by aerial-netting ad libitum on military installations in southern (near Kandahar City) and eastern (Bagram Air Field) Afghanistan from June 2010 through January 2011. Collected specimens were curated, photographed, and identified to species if possible. Voucher specimens and photographic prints were deposited in the Florida State Collection of Arthropods (FSCA), Division of Plant Industry (DPI), Florida Department of Agriculture and Consumer Services (FDACS). Logistical challenges prevented the authors from surveying outside of their respective areas of operation; thus, a literature review was also conducted to further identify stinging Hymenoptera species recorded in Afghanistan. For World Wide Web and specimen record database searches, we used various combinations of the following key words: Hymenoptera, Afghanistan, Iran, Iraq, Kyrgyzstan, Pakistan, Tajikistan, Turkey, Uzbekistan, Middle East, Asia, bees, wasps, ants, hornets, checklist, distribution, and taxonomy.

Supraspecific taxonomy in our checklist follows Goulet and Huber (1993) with the exception of the taxonomic placement of Crabronidae (Alexander 1992; see also Pulawski 2003), and Anthophoridae, which are now included within Apidae (Ascher and Pickering 2013). Superfamilies, families, and species are listed alphabetically and do not imply any phylogenetic relationships within or between these taxonomic divisions. Common names often associated with family level groupings (VanDyk and Belov 2013) are included in Table 1. Record type (i.e., collected, observed, or recorded in the literature), sociality, and literature references for species records are given after the species name and authority in Table 1. Sociality was gleaned from the literature but in some cases species-specific information could not be found; thus, 'unknown' was listed with those species in genera known to show both types of life histories.

Results and Discussion

In total, 396 potentially medically important Hymenoptera species representing 14 families were collected or determined from the literature during this study (Table 1). None of the species collected were new records for Afghanistan. Three of the species collected, *Polistes wattii* Cameron, *Vespula germanica* (Fabricius), and *Vespa orientalis* Linnaeus, were very common near man-made structures located on military installations. The superfamilies Apoidea and Vespoidea account for all stinging species of Hymenoptera in Afghanistan. While our literature review provided most of the species names in our checklist, relatively few publications specifically address Hymenoptera species found in Afghanistan. In addition, records for Afghanistan were often limited to country name and region, with no detailed locality information.

The checklist presented here is based on the summary of results provided by Turbyville et al. (2013). We include additional species, but the checklist should still be considered preliminary. Turbyville et al. (2013) provide a detailed discussion and statistical analyses of insect venom hypersensitivity to U.S. service members operating in this region. Species records obtained from internet-accessible databases may require further vetting. Additional field surveys and examination of institutional insect collections will likely augment this list. These baseline data are intended to provide a starting point for public health entomology specialists as well as collection managers and other taxonomic researchers focusing on Hymenoptera in this region.

Endnotes

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Table 1. Checklist of medically important Hymenoptera of Afghanistan.

C = Collected in Afghanistan during this study; **O = Observed** in Afghanistan during this study; **R = Reported** in the literature from Afghanistan. Species names with 'Unknown' indicate that both solitary and social behaviors have been observed or sociality was not reported in the literature. Non-aculeate Hymenoptera are not listed.

Apocrita (Aculeata)
Apoidea (Apiformes)**Andrenidae (mining bees)**

- Andrena afghana* Warncke. **R.** Solitary. Ascher and Pickering 2013
A. albopunctata (Rossi). **R.** Solitary. Ascher and Pickering 2013
A. caroli Pérez. **R.** Solitary. Ascher and Pickering 2013
A. cinereophila Warncke. **R.** Solitary. Ascher and Pickering 2013
A. everna Warncke. **R.** Solitary. Ascher and Pickering 2013
A. flavipes Panzer. **R.** Solitary. Ascher and Pickering 2013
A. fuscata Erichson. **R.** Solitary. Ascher and Pickering 2013
A. induta Morawitz. **R.** Solitary. Ascher and Pickering 2013
A. jalalabadensis Warnke. **R.** Solitary. Ascher and Pickering 2013
A. labialis (Kirby). **R.** Solitary. Ascher and Pickering 2013
A. laghmana Warncke. **R.** Solitary. Ascher and Pickering 2013
A. marmora Nurse. **R.** Solitary. Ascher and Pickering 2013
A. nigroaenea (Kirby). **R.** Solitary. Ascher and Pickering 2013
A. oulskii Radoszkowski. **R.** Solitary. Ascher and Pickering 2013
A. ovatula (Kirby). **R.** Solitary. Ascher and Pickering 2013
A. pilipes Fabricius. **R.** Solitary. Ascher and Pickering 2013
A. prunella Warnke. **R.** Solitary. Ascher and Pickering 2013
A. savignyi Spinola. **R.** Solitary. Ascher and Pickering 2013
A. scita Eversmann. **R.** Solitary. Maria Ban and Tomozei 2006
A. similis Smith. **R.** Solitary. Ascher and Pickering 2013
A. spreata Pérez. **R.** Solitary. Ascher and Pickering 2013
A. transitoria Morawitz. **R.** Solitary. Ascher and Pickering 2013
Camptopoeum afghanicum Patiny. **R.** Solitary. Ascher and Pickering 2013
C. rufiventre Morawitz. **R.** Solitary. Ascher and Pickering 2013
Panurgus afghanensis Warnke. **R.** Solitary. Ascher and Pickering 2013

Apidae (cuckoo, carpenter, digger, bumble, and honey bees)

- Apis mellifera* Linnaeus. **O/R.** Social. Woyke 1984
A. cerana Fabricius. **R.** Social. Radloff et al. 2005
A. dorsata Fabricius. **R.** Social. Santibanez and Bell 2012
A. florea Fabricius. **R.** Social. Gupta 2004
Bombus asiaticus Morawitz. **R.** Social. Gupta 2004
B. biroi Vogt. **R.** Social. Gupta 2004
B. branickii (Radoszkowski). **R.** Social. Gupta 2004
B. cullumanus (Kirby). **R.** Social. Gupta 2004
B. ferganicus (Radoszkowski). **R.** Social. Gupta 2004
B. keriensis Morawitz. **R.** Social. Gupta 2004
B. kotzschii Reinig. **R.** Social. Ascher and Pickering 2013
B. lucorum (Linnaeus). **R.** Social. Gupta 2004
B. marussinus Skorikov. **R.** Social. Gupta 2004
B. melanurus Lepeletier. **R.** Social. Gupta 2004
B. morawitzi Radoszkowski. **R.** Social. Ascher and Pickering 2013
B. morawitzianus (Popov). **R.** Social. Gupta 2004
B. obtusus Richards. **R.** Social. Gupta 2004

- B. semenovianus* (Skorikov). **R.** Social. Gupta 2004
B. subtypicus Morawitz. **R.** Social. Gupta 2004
B. terrestris (Linnaeus). **R.** Social. Gupta 2004
B. tunicatus Smith. **R.** Social. Gupta 2004
Ceratina hieratica Baker. **R.** Solitary. Ascher and Pickering 2013
Eucera afghana Tkalců. **R.** Solitary. Ascher and Pickering 2013
E. arachosiae Tkalců. **R.** Solitary. Ascher and Pickering 2013
E. hispana Lepeletier. **R.** Solitary. Gupta 2004
E. capsica Morawitz. **R.** Solitary. Gupta 2004
E. clypeata Erichson. **R.** Solitary. Gupta 2004
E. diana Nurse. **R.** Solitary. Ascher and Pickering 2013
E. dimidiata Brullé. **R.** Solitary. Ascher and Pickering 2013
E. ferruginea Lepeletier. **R.** Solitary. Ascher and Pickering 2013
E. hispana Lepeletier. **R.** Solitary. Ascher and Pickering 2013
E. pusilla Morawitz. **R.** Solitary. Ascher and Pickering 2013
E. sogdiana Morawitz. **R.** Solitary. Ascher and Pickering 2013
Melecta excelsa Lieftinck. **R.** Solitary. Ascher and Pickering 2013
M. kuschakewiczi (Radoszkowski). **R.** Solitary. Ascher and Pickering 2013
Nomada distinguenda Morawitz. **R.** Solitary. Ascher and Pickering 2013
N. immaculata Morawitz. **R.** Solitary. Ascher and Pickering 2013
N. ruficollis Morawitz. **R.** Solitary. Ascher and Pickering 2013
N. xanthopoda Schwarz. **R.** Solitary. Ascher and Pickering 2013
Parammobatodes nuristanus (Warncke). **R.** Solitary. Ascher and Pickering 2013
Pasites maculatus Jurine. **R.** Solitary. Ascher and Pickering 2013
Tetraloniella nigriceps (Morawitz). **R.** Solitary. Ascher and Pickering 2013
Thyreus ramosus (Lepeletier). **R.** Solitary. Ascher and Pickering 2013
Xylocopa angulosa Maa. **R.** Solitary. Ascher and Pickering 2013
X. bentoni Cockerell. **R.** Unknown. Gupta 2004
X. bicristata Maa. **R.** Solitary. Ascher and Pickering 2013
X. fenestrata (Fabricius). **R.** Solitary. Ascher and Pickering 2013
X. hedicki Ozdikmen. **R.** Solitary. Ascher and Pickering 2013
X. iris (Christ). **R.** Solitary. Ascher and Pickering 2013
X. olivieri Lepeletier. **R.** Solitary. Ascher and Pickering 2013
X. parviceps Morawitz. **R.** Solitary. Ascher and Pickering 2013
X. povolnyi Tkalců. **R.** Solitary. Ascher and Pickering 2013
X. pseudoviolacea Popov. **R.** Solitary. Ascher and Pickering 2013
X. turanica Morawitz. **R.** Solitary. Ascher and Pickering 2013
X. valga Gerstäcker. **R.** Solitary. Ascher and Pickering 2013
X. varentzowi Morawitz. **R.** Solitary. Ascher and Pickering 2013

Colletidae (plasterer and yellow-faced bees)

- Colletes morawitzi* Noskiewicz. **R.** Solitary. Ascher and Pickering 2013
Hylaeus communis Nylander. **R.** Solitary. Ascher and Pickering 2013
H. dolichocephalus Morawitz. **R.** Solitary. Ascher and Pickering 2013

Halictidae (sweat bees)

- Ceylalictus punjabensis* (Cameron). **R.** Unknown. Ascher and Pickering 2013
Halictus brunnescens (Eversmann). **R.** Solitary. Dikmen and Aytekin 2011
H. cephalicus Morawitz. **R.** Solitary. Ascher and Pickering 2013
H. determinandus Dalla Torre. **R.** Solitary. Ascher and Pickering 2013
H. funerarius Morawitz. **R.** Solitary. Ascher and Pickering 2013
H. humkalensis Blüthgen. **R.** Solitary. Ascher and Pickering 2013
H. kuschkenensis Ebmer. **R.** Solitary. Ascher and Pickering 2013
H. lucipennis Smith. **R.** Solitary. Ascher and Pickering 2013

- H. maculatus* Smith. **R.** Solitary. Ascher and Pickering 2013
H. minor Morawitz. **R.** Solitary. Pauly et al. 2013
H. mucoreus Eversmann. **R.** Solitary. Ascher and Pickering 2013
H. nasica Morawitz. **R.** Solitary. Ascher and Pickering 2013
H. nuristanicus Pesenko. **R.** Solitary. Ascher and Pickering 2013
H. paropamisos Ebmer. **R.** Solitary. Ascher and Pickering 2013
H. pulvereus Morawitz. **R.** Solitary. Ascher and Pickering 2013
H. quadricinctus (Fabricius). **R.** Solitary. Ascher and Pickering 2013
H. seladonius (Fabricius). **R.** Solitary. Ascher and Pickering 2013
H. semitectus Morawitz. **R.** Solitary. Ascher and Pickering 2013
H. semiticus Blüthgen. **R.** Solitary. Ascher and Pickering 2013
H. senilis (Eversmann). **R.** Solitary. Dikmen and Aytakin 2011
H. takuiricus Blüthgen. **R.** Solitary. Ascher and Pickering 2013
Lasioglossum acherontion Ebmer. **R.** Unknown. Pauly 2011.
L. albitarsoides (Blüthgen). **R.** Unknown. Pauly 2013
L. algirum (Blüthgen). **R.** Unknown. Ascher and Pickering 2013
L. annulipes (Morawitz). **R.** Unknown. Ascher and Pickering 2013
L. aschabadiense (Blüthgen). **R.** Unknown. Pauly 2013
L. brevicorne (Schenck). **R.** Unknown. Pauly 2013
L. capsicum (Morawitz). **R.** Unknown. Pauly 2013
L. chloridicum Ebmer. **R.** Unknown. Ascher and Pickering 2013
L. clypeiferellum (Strand). **R.** Unknown. Pauly 2013
L. croceipes (Morawitz). **R.** Unknown. Ascher and Pickering 2013
L. debile Ebmer. **R.** Unknown. Pauly 2013
L. discum (Smith). **R.** Unknown. Ascher and Pickering 2013
L. dolus Ebmer. **R.** Unknown. Pauly 2013
L. epiptygiale (Blüthgen). **R.** Unknown. Pauly 2013
L. exulans Ebmer. **R.** Unknown. Ascher and Pickering 2013
L. fallax (Morawitz). **R.** Unknown. Ascher and Pickering 2013
L. filipes Ebmer. **R.** Unknown. Pauly 2013
L. fulvitarso (Morawitz). **R.** Unknown. Ascher and Pickering 2013
L. fulvopacum Ebmer. **R.** Unknown. Ascher and Pickering 2013
L. griseolum (Morawitz). **R.** Unknown. Pauly 2013
L. hilare Ebmer. **R.** Unknown. Pauly 2013
L. hyalinipennis (Morawitz). **R.** Unknown. Pauly 2013
L. hypsiston Ebmer. **R.** Unknown. Ascher and Pickering 2013
L. ilicum (Blüthgen). **R.** Unknown. Pauly 2013
L. laevinode (Morawitz). **R.** Unknown. Pauly 2013
L. leucopymatum (Dalla Torre). **R.** Unknown. Pauly 2013
L. maculipes (Morawitz). **R.** Unknown. Pauly 2013
L. massuricum (Blüthgen). **R.** Unknown. Pauly 2013
L. mesosclerum (Pérez). **R.** Unknown. Pauly 2013
L. mesoviride Ebmer. **R.** Unknown. Ascher and Pickering 2013
L. nigrilabre (Morawitz). **R.** Unknown. Ascher and Pickering 2013
L. obscuratum (Morawitz). **R.** Unknown. Pauly 2013
L. opacolum Ebmer. **R.** Unknown. Pauly 2013
L. orion Ebmer. **R.** Unknown. Ascher and Pickering 2013
L. orpheopse (Blüthgen). **R.** Ascher and Pickering 2013
L. orpheum (Nurse). **R.** Unknown. Pauly 2013
L. osiris Ebmer. **R.** Unknown. Ascher and Pickering 2013
L. pallidum (Radoszkowski). **R.** Unknown. Ascher and Pickering 2013
L. persicum (Cockerell). **R.** Unknown. Pauly 2013
L. picipes (Morawitz). **R.** Unknown. Ascher and Pickering 2013
L. pistorium (Vachal). **R.** Unknown. Pauly 2013

- L. pseudoleptorhynchum* (Blüthgen). **R.** Unknown. Pauly et al. 2013
L. pygmaeum (Schenck). **R.** Unknown. Pauly et al. 2013
L. rhynchites (Morawitz). **R.** Unknown. Ascher and Pickering 2013
L. salebrosum (Blüthgen). **R.** Unknown. Pauly 2013
L. schoischi Ebmer. **R.** Unknown. Pauly 2013
L. semilucens (Alfken). **R.** Unknown. Pauly 2013
L. skorikovi (Blüthgen). **R.** Unknown. Ascher and Pickering 2013
L. subequestre (Blüthgen). **R.** Unknown. Ascher and Pickering 2013
L. sublaterale (Blüthgen). **R.** Unknown. Ascher and Pickering 2013
L. suppressum Ebmer. **R.** Unknown. Pauly 2013
L. tarsatum (Schenck). **R.** Unknown. Pauly 2013
L. tadschicum (Blüthgen). **R.** Unknown. Ascher and Pickering 2013
L. tschakarense (Blüthgen). **R.** Unknown. Pauly 2013
L. urguticum Ebmer. **R.** Unknown. Ascher and Pickering 2013
L. vagans (Smith). **R.** Unknown. Ascher and Pickering 2013
Nomiapis bispinosa Brullé. **R.** Unknown. Pauly 2013
N. diversipes (Latreille). **R.** Unknown. Güler et al. 2011
N. kophenes Baker. **R.** Unknown. Pauly 2013
N. bactriensis Pesenko. **R.** Unknown. Ascher and Pickering 2013
N. gussakovskiji Blüthgen. **R.** Unknown. Ascher and Pickering 2013
N. klausii Pesenko. **R.** Unknown. Pesenko and Pauly 2005
N. ino Nurse. **R.** Unknown. Ascher and Pickering 2013
Pseudapis bispinosa (Brullé). **R.** Unknown. Ascher and Pickering 2013
P. edentata (Morawitz). **R.** Unknown. Pauly 2013
P. kophenes (Baker). **R.** Unknown. Ascher and Pickering 2013
P. nilotica (Smith). **R.** Unknown. Ascher and Pickering 2013
P. platula (Warncke). **R.** Unknown. Ascher and Pickering 2013
Seladonia lucidipennis (Smith). **R.** Unknown. Pesenko 2006
S. pollinosa cariniventris (Morawitz). **R.** Unknown. Pesenko 2006
Vestitohalictus kuschkenensis (Ebmer). **R.** Unknown. Pauly 2013
V. mucoreus (Eversmann). **R.** Unknown. Pauly 2013
V. surabadensis (Ebmer). **R.** Unknown. Pauly 2013

Megachilidae (leaf-cutter and mason bees)

- Anthidium afghanistanicum* Mavromoustakis. **R.** Solitary. Gupta 2004
A. eremicum Alfken. **R.** Solitary. Ascher and Pickering 2013
A. klapperichi Mavromoustakis. **R.** Solitary. Ascher and Pickering 2013
A. montanum reichardti Gussakovskij. **R.** Solitary. Mavromoustakis 1965
A. septemspinosa Lepeletier. **R.** Solitary. Ascher and Pickering 2013
A. syriacum Pérez. **R.** Solitary. Ascher and Pickering 2013
Coelioxys sogdiana Morawitz. **R.** Solitary. Ascher and Pickering 2013
Haetosmia brachyura (Morawitz). **R.** Solitary. Ascher and Pickering 2013
Hoplitis perezii (Ferton). **R.** Solitary. Ascher and Pickering 2013
H. picicornis (Morawitz). **R.** Solitary. Ascher and Pickering 2013
Megachile albifasciata Rebmann. **R.** Solitary. Ascher and Pickering 2013
M. albimarginalis Rebmann. **R.** Solitary. Ascher and Pickering 2013
M. arachosiana Gonzalez, Engel, and Hinojosa-Diaz. **R.** Solitary. Gonzalez et al. 2010
M. asiatica Morawitz. **R.** Solitary. Ascher and Pickering 2013
M. babylonica Rebmann. **R.** Solitary. Ascher and Pickering 2013
M. flavidula Rebmann. **R.** Solitary. Ascher and Pickering 2013
M. jakesi Tkalců. **R.** Solitary. Ascher and Pickering 2013
M. persica Rebmann. **R.** Solitary; Ascher and Pickering 2013
M. picicornis Morawitz. **R.** Solitary; Ascher and Pickering 2013
M. povolnyi (Tkalců). **R.** Solitary. Ascher and Pickering 2013

M. proxima Smith. **R.** Solitary. Ascher and Pickering 2013
M. striatella Rebmann. **R.** Solitary. Ascher and Pickering 2013
M. tenorai (Tkalčů). **R.** Solitary. Ascher and Pickering 2013
M. transgrediens Rebmann. **R.** Solitary. Ascher and Pickering 2013
Osmia fasciata Latreille. **R.** Solitary. Ascher and Pickering 2013
O. fedtschenkoi Morawitz. **R.** Solitary. Ascher and Pickering 2013
O. indigotea Morawitz. **R.** Solitary. Ascher and Pickering 2013
O. longicornis Morawitz. **R.** Solitary. Ascher and Pickering 2013
O. mediana Engel. **R.** Solitary. Engel 2006
O. sogdiana Morawitz. **R.** Solitary. Ascher and Pickering 2013

Melittidae (melittid bees)

Melitta dimidiata Morawitz. **R.** Solitary. Michez 2013
M. leporina (Panzer). **R.** Solitary. Ascher and Pickering 2013
M. piersbakeri Engel. **R.** Solitary. Ascher and Pickering 2013
M. sibirica (Morawitz). **R.** Solitary. Ascher and Pickering 2013

Apoidea (Spheciformes)

Crabronidae (n/a; sensu Alexander 1992)

Ammatomus mesotenus (Handlirsch). **R.** Solitary. Pulawski 2003
Astata boops (Schränk). **R.** Solitary. Pulawski 2003
A. diabolica Balthasar. **R.** Solitary. Pulawski 2003
Belomicrus sp. **R.** Solitary. Pulawski 2003
Bembecinus asiaticus Gussakovskij. **R.** Solitary. Pulawski 2003
Bembix bicolor Radoszkowski. **R.** Solitary. Pulawski 2003
B. eburnea Radoszkowski. **R.** Solitary. Pulawski 2003
B. kirgisica Morawitz. **R.** Solitary. Pulawski 2003
B. melanura Morawitz. **R.** Solitary. Pulawski 2003
B. oculata Panzer. **R.** Solitary. Pulawski 2003
B. rostrata (Linnaeus). **R.** Solitary. Pulawski 2003
Cerceris bicincta Klug. **R.** Solitary. Pulawski 2003
C. bupresticida Dufour. **R.** Solitary. Pulawski 2003
C. dorsalis Eversmann. **R.** Solitary. Pulawski 2003
C. fimbriata (Rossi). **R.** Solitary. Pulawski 2003
C. povolnyi de Beaumont. **R.** Solitary. Pulawski 2003
C. quadricincta (Panzer). **R.** Solitary. Pulawski 2003
C. rubida (Jurine). **R.** Solitary. Pulawski 2003
C. sabulosa (Panzer). **R.** Solitary. Pulawski 2003
C. spinipectus Smith. **R.** Solitary. Pulawski 2003
C. vagans Radoszkowski. **R.** Solitary. Pulawski 2003
Crabro tuberculiger Kohl. **R.** Solitary. Pulawski 2003
C. uljanini Radoszkowski. **R.** Solitary. Pulawski 2003
Crossocerus klapperichi de Beaumont. **R.** Solitary. Pulawski 2003
Diodontus minutus (Fabricius). **R.** Solitary. Pulawski 2003
Dryudella nuristanica (Balthasar). **R.** Solitary. Pulawski 2003
Ectemnius confinis (Walker). **R.** Solitary. Pulawski 2003
E. sexcinctus (Fabricius). **R.** Solitary. Pulawski 2003
E. meridionalis (Costa). **R.** Solitary. Pulawski 2003
Laphyragogus sp. **R.** Solitary. Pulawski 2003
Lindenius afghanus Leclercq. **R.** Solitary. Pulawski 2003
L. panzeri (Vander Linden). **R.** Solitary. Pulawski 2003
L. prosopiformis (Nurse). **R.** Solitary. Pulawski 2003
L. pygmaeus (Rossi). **R.** Solitary. Pulawski 2003
L. satschouanus (Kohl). **R.** Solitary. Pulawski 2003

Liris atratus (Spinola). **R.** Solitary. Pulawski 2003
L. festinans (Smith). **R.** Solitary. Pulawski 2003
L. haemorrhoidalis (Fabricius). **R.** Solitary. Pulawski 2003
L. memnonius (Smith). **R.** Solitary. Pulawski 2003
L. niger (Fabricius). **R.** Solitary. Pulawski 2003
L. nigricans (Walker). **R.** Solitary. Pulawski 2003
L. subtessellatus (Smith). **R.** Solitary. Pulawski 2003
Mimumesa unicolor (Vander Linden). **R.** Solitary. Pulawski 2003
Oxybelus haemorrhoidalis Olivier. **R.** Solitary. Pulawski 2003
O. lamellatus Olivier. **R.** Solitary. Pulawski 2003
O. latro Olivier. **R.** Solitary. Pulawski 2003
O. mucronatus (Fabricius). **R.** Solitary. Pulawski 2003
O. quatuordecimnotatus Jurine. **R.** Solitary. Pulawski 2003
O. subspinosus Klug. **R.** Solitary. Pulawski 2003
O. variegates Wesmael. **R.** Solitary. Pulawski 2003
Palarus variegates (Fabricius). **R.** Solitary. Pulawski 2003
Pemphredon lethifer (Shuckard). **R.** Solitary. Pulawski 2003
Philanthus triangulum (Fabricius). **R.** Solitary. Pulawski 2003
Solierella sp. **R.** Solitary. Pulawski 2003
Sphecius persa Gussakovskij. **R.** Solitary. Pulawski 2003
S. uljanini (Radoszkowski). **R.** Solitary. Pulawski 2003
Stizoides tridentatus (Fabricius). **R.** Solitary. Pulawski 2003
Stizus bipunctatus (Smith). **R.** Solitary. Pulawski 2003
S. koenigi Morawitz. **R.** Solitary. Pulawski 2003
S. spectrum Handlirsch. **R.** Solitary. Pulawski 2003
Tachysphex consocius Kohl. **R.** Solitary. Pulawski 2003
T. incertus (Radoszkowski). **R.** Solitary. Pulawski 2003
T. mocsaryi Kohl. **R.** Solitary. Pulawski 2003
T. schmiedeknechti Kohl. **R.** Solitary. Pulawski 2003
T. unicolor (Panzer). **R.** Solitary. Pulawski 2003
Tachytes levantinus Pulawski. **R.** Solitary. Pulawski 2003
T. matronalis Dahlbom. **R.** Solitary. Pulawski 2003
Tachytes sp. **C.** Unknown. Pulawski 2003
Trypoxylon attenuatum Smith. **R.** Solitary. Pulawski 2003
T. klapperichi Balthasar. **R.** Solitary. Pulawski 2003
T. scutatum Chevrier. **R.** Solitary. Pulawski 2003

Sphecidae (thread-waisted wasps)

Ammophila afghanica Balthasar. **R.** Solitary. Pulawski 2003
A. assimilis Kohl. **R.** Solitary. Pulawski 2003
A. dentigera Gussakovskij. **R.** Solitary. Pulawski 2003
A. gracillima Taschenberg. **R.** Solitary. Pulawski 2003
A. heydeni Dahlbom. **R.** Solitary. Pulawski 2003
A. hungarica Mocsáry. **R.** Solitary. Pulawski 2003
A. sarekandana Balthasar. **R.** Solitary. Pulawski 2003
Chalybion femoratum (Fabricius). **R.** Solitary. Pulawski 2003
C. klapperichi (Balthasar). **R.** Solitary. Pulawski 2003
Chlorion magnificum Morawitz. **R.** Solitary. Pulawski 2003
C. regale Smith. **R.** Solitary. Pulawski 2003
Eremochares dives (Brullé). **R.** Solitary. Pulawski 2003
Palmodes occitanicus (Fargeau and Serville). **R.** Solitary. Pulawski 2003
Parapsammophila algira (Kohl). **R.** Solitary. Pulawski 2003
Podalonia afghanica Balthasar. **R.** Solitary. Pulawski 2003
P. alpina (Kohl). **R.** Solitary. Pulawski 2003

P. ebenina (Spinola). **R.** Solitary. Pulawski 2003
P. hirsuta (Scopoli). **R.** Solitary. Pulawski 2003
P. tydei (Le Guillou). **R.** Solitary. Pulawski 2003
Prionyx afghaniensis (de Beaumont). **R.** Solitary. Pulawski 2003
P. haberhaueri (Radoszkowski). **R.** Solitary. Pulawski 2003
P. macula (Fabricius). **R.** Solitary. Pulawski 2003
P. nudatus (Kohl). **R.** Solitary. Pulawski 2003
P. songaricus (Eversmann). **R.** Solitary. Pulawski 2003
P. stschurowskii (Radoszkowski). **R.** Solitary. Pulawski 2003
P. viduatus (Christ). **R.** Solitary. Pulawski 2003
Sceliphron curvatum (Smith). **R.** Solitary. Pulawski 2003
S. destillatorium (Illiger). **R.** Solitary. Pulawski 2003
S. madraspatanum (Fabricius). **R.** Solitary. Pulawski 2003
S. seistaniensis Jha and Farooqi. **R.** Solitary. Pulawski 2003
Sphex flavipennis Fabricius. **R.** Solitary. Pulawski 2003
S. funerarius Gussakovskij. **R.** Solitary. Pulawski 2003
S. leuconotus Brullé. **R.** Solitary. Pulawski 2003
S. oxianus Gussakovskij. **R.** Solitary. Pulawski 2003
S. pruinus Germar. **R.** Solitary. Pulawski 2003

Ampulicidae

Ampulex fulgens de Beaumont. **R.** Solitary. Pulawski 2003

Vespoidea

Bradynobaenidae (bradynobaenid wasps)

Apterogyna appropinqua Skorikov. **R.** Solitary. Lelej and Kabakov 1980
Macroocula morawitzi (Radoszkowski). **R.** Solitary; Lelej and Kabakov 1980
M. panfilovi Lelej. **R.** Solitary. Lelej and Kabakov 1980

Formicidae (ants)

Aenictus wroughtoni sagei Forel. **R.** Social. Pisarski 1967
Euponera ochracea (Mayr). **R.** Social. Pisarski 1967
Myrmica afghanica Radchenko and Elmes. **R.** Social. Radchenko and Elmes 2003
M. aimonissabaudiae Menozzi. **R.** Social. Bharti 2008
Tetramorium schneideri Emery. **R.** Social. Paknia et al. 2010

Mutillidae (velvet ants)

Artiotilla afghanica (Suárez). **R.** Solitary. Lelej and Kabakov 1980
Bischoffitilla afghanica (Lelej). **R.** Solitary. Lelej and Kabakov 1980
Dasylabris bucharensis Skorikov. **R.** Solitary. Lelej and Kabakov 1980
D. desertorum (Radoszkowski). **R.** Solitary. Lelej and Kabakov 1980
D. hazara Lelej. **R.** Solitary. Lelej and Kabakov 1980
D. indra Lelej. **R.** Solitary. Lelej and Kabakov 1980
D. intermedia Skorikov. **R.** Solitary. Lelej and Kabakov 1980
D. miranda Lelej. **R.** Solitary. Lelej and Kabakov 1980
D. mitra Lelej. **R.** Solitary. Lelej and Kabakov 1980
D. mongolica (Radoszkowski). **R.** Solitary. Lelej and Kabakov 1980
Dentilla dichroa (Sichel and Radoszkowski). **R.** Solitary. Lelej et al. 2008
D. speciosa (Lelej). **R.** Solitary. Lelej and Kabakov 1980
D. zarudnyi Lelej. **R.** Solitary; Lelej and Kabakov 1980
Ephutomma deserta Lelej. **R.** Solitary. Lelej and Kabakov 1980
Myrmilla badchysiana Lelej. **R.** Solitary. Lelej and Kabakov 1980
M. kabulensis Lelej. **R.** Solitary. Lelej and Kabakov 1980
M. lagmana Lelej. **R.** Solitary. Lelej and Kabakov 1980

M. rostriformis Lelej. **R.** Solitary. Lelej and Kabakov 1980
Mutilla erschoffii Radoszkowski. **R.** Solitary. Lelej and Kabakov 1980
Nemka aurantiaca (Skorikov). **R.** Solitary. Lelej and Kabakov 1980
Nuristanilla kabakovi Lelej. **R.** Solitary. Lelej and Kabakov 1980
Promecilla vinuta (Nagy). **R.** Solitary. Lelej and Kabakov 1980
Pseudomyrmosa minuta (Morawitz). **R.** Solitary. Lelej and Kabakov 1980
Pseudophotopsis afghanica Lelej. **R.** Solitary. Lelej and Kabakov 1980
P. binghami (Bischoff). **R.** Solitary. Lelej and Kabakov 1980
P. brachythorax (Skorikov). **R.** Solitary. Lelej and Kabakov 1980
P. caspica (Radoszkowski). **R.** Solitary. Lelej and Kabakov 1980
P. caucasica (Radoszkowski). **R.** Solitary. Lelej and Kabakov 1980
P. irana (Skorikov). **R.** Solitary. Lelej and Kabakov 1980
P. kabakovi Lelej. **R.** Solitary. Lelej and Kabakov 1980
P. pavlovskyi Skorikov. **R.** Solitary. Lelej and Kabakov 1980
Skorikovia elongata (Radoszkowski). **R.** Solitary. Lelej and Kabakov 1980
Smicromyrme turanica (Morawitz). **R.** Solitary. Lelej and Kabakov 1980
Stenomutilla sejugis (Radoszkowski). **R.** Solitary. Lelej and Kabakov 1980
Tricholabiodes nuristanus Lelej. **R.** Solitary. Lelej and Kabakov 1980

Pompilidae (spider wasps)

Agenioideus excisus (Morawitz). **R.** Solitary. Wolf 1968
Apareia kassebeeri Wahis. **R.** Solitary. Wahis 2005
Arachnotheutes minor tunesiacus Wolf. **R.** Solitary. Wolf 2005
Claveliocnemis incisipennis Wolf. **R.** Solitary. Zonstein 2007
Cryptocheilus discolor (Fabricius). **R.** Solitary. Wolf 1968
C. notatum melanium (Lepeletier). **R.** Solitary. Wolf 1968
C. pseudonotatum Suster. **R.** Solitary. Wolf 1968
C. rubellum (Eversmann). **R.** Solitary. Wolf 1968
C. stehliki Wolf. **R.** Solitary. Wolf 1968
Ctenagenia ozbeki Wahis. **R.** Solitary. Ebrahimi et al. 2008
Dicyrtomellus kizilkumi (Radoszkowski). **R.** Solitary. Wolf 1968
Eoferreola manticata (Pallas). **R.** Solitary. Wahis and Schmid-Egger 2002
Ferreola diffinis (Lepeletier). **R.** Solitary. Wolf 1968
Paragenioides povolnyi Wolf. **R.** Solitary. Wolf 1968
Pareiocurgus bactriacus Wolf. **R.** Solitary. Wolf 1968
Pompilus plumbeus plumbeus (Fabricius). **R.** Solitary. Wolf 1968
Tachyagetes excellens Haupt. **R.** Solitary. Wolf 1968
Tachypompilus analis (Fabricius). **R.** Solitary. Wolf 1968

Vespidae (yellow-jackets, hornets, paper wasps; potter, mason, and pollen wasps)

Ancistrocercus antelope (Panzer). **R.** Social. Renneson 2013
A. gazella (Panzer). **R.** Solitary. Dvorak and Castro 2007
Delta dimidiatipenne (de Saussure). **R.** Social. Renneson 2013
Dolichovespula intermedia (Birula). **R.** Social. Archer 1989
 (also see Carpenter and Kojima 2002)
D. sylvestris (Scopoli). **R.** Social. Bagriacik and Samin 2011
Katamenes tauricus (de Saussure). **R.** Social. Dvorak and Castro 2007
Polistes dominulus (Christ). **R.** Social. Carpenter 1996
P. gallicus (Linnaeus). **R.** Social. Carpenter 1996
P. indicus Stolf. **R.** Social. Carpenter 1996
P. olivaceus (DeGeer). **R.** Social. Carpenter 1996
P. watti Cameron. **C/R.** Social. Carpenter 1996
Rhynchium brunneum (Fabricius). **R.** Unknown. Srinivasan and Kumar 2010
Vespula germanica (Fabricius). **C/R.** Social. Archer 1989

V. auraria Smith. **R.** Social. Archer 1989

V. orientalis Linnaeus. **C/R.** Social. Archer 1989

V. tropica (Linnaeus). **R.** Social. Thi Phuong Lien and Carpenter 2002

